# The Veterinary Record

FOUNDED BY WILLIAM HUNTING, F.R.C.V.S., 1888.

No. 30. JULY 27, 1940. Vol. 52.


## THE ROUTE OF INJECTION IN ACTIVE IMMUNISATION OF HORSES AGAINST TETANUS*


R. F. MONTGOMERIE,

Wellcome Physiological Research Laboratories, Beckenham, Kent


In 1930 Glenny introduced Alum Precipitated Tetanus Toxoid for the active immunisation of horses against tetanus and the injection of this product is now the accepted method of conferring an active protection. The disadvantage in its use is a tendency to cause some local pain and oedema. Generally this reaction is slight and disappears within three days, causing no interference with work if the horses are injected at the end of the week. Occasionally the reaction is more pronounced and persistent, making it necessary to rest the horse; only very rarely is it really troublesome.

The accepted practice is the injection of two doses of the toxoid, the interval between injections being four weeks. It is known that this affords a good durable active immunity which may be enhanced and made even more permanent by the injection of a third dose some three months after the second. As with the great majority of vaccines used in veterinary practice, the toxoid has generally been injected subcutaneously.

All the horses entering these Laboratories for serum production or as work horses are immunised with this product. A number of these horses have been used in an observation designed to determine whether the severity of the reaction was reduced by the intramuscular, rather than the subcutaneous, injection of the toxoid. The influence of the route of injection on the immunity response has been studied by Mr. A. T. Glenny who has supplied the figures set out in the table.

Two hundred consecutive in-coming horses were used and successive small groups received their injection either, (*a*) both injections subcutaneously, (*b*) one subcutaneously and one intramuscularly, (*c*) both intramuscularly. The site of injection was well forward in the neck; the type of needle used was constant; the near side chosen for the first injection and the off side for the second. The interval between the injections was four weeks. A blood sample was taken for test 14 days after the second injection.

Throughout the observation it was evident that the reaction following intramuscular injection was less marked than that following subcutaneous, although within each group there was marked variation from horse to horse. There was some tenderness around the site of intramuscular injection in the majority of the horses; occasionally it persisted for two or three days and in about 10 per cent. of cases would have necessitated rest from work for that period.

Table

Showing Antitoxic Value of Horses Fourteen Days after the Second Injection of Alum Precipitated Tetanus Toxoid

| *Method of Injection.* | *Number of Horses* — *U.S.A. Units of Tetanus Antitoxin per c.c. of Serum.* | | | | | *Total.* |
|---|---|---|---|---|---|---|
| | 1 to 10 | 10 to 25 | 25 to 50 | 50 to 100 | 100to 200 | |
| Both subcutaneous | 15 | 26 | 3 | 1 | 0 | 45 |
| One s/c; one i/m | 8 | 13 | 20 | 3 | 0 | 44 |
| Both intramuscular | 8 | 33 | 29 | 29 | 2 | 101 |

The difference in immunity response was more outstanding and the figures quoted in the table clearly illustrate the advantage of intramuscular injection. While only 9 per cent. of the horses which had two subcutaneous injections had more than 25 units of antitoxin in their blood after 14 days, 52 per cent. of those receiving one injection by each route and 60 per cent. of those receiving two intramuscular injections exceeded this level.

It would seem that every advantage attaches to the intramuscular injection. Since this observation was concluded all horses, some 800, entering the Laboratories have been injected by this route and it was evident that these injections caused less inconvenience to the horses than did the subcutaneous injections previously used.

It may not be out of place to comment here on the surprisingly small extent to which active immunisation against tetanus is practised in this country. Despite the fact that it was first introduced here, it is much more popular in several continental countries; in some, all military horses are immunised. Apart from the obvious benefit by preventing tetanus, the practice of prophylactic vaccination has another interesting and, maybe, material advantage. Horses which have previously had two or more injections of toxoid can be quickly hyper-immunised and readily produce high value tetanus antitoxin. If a large reserve of protected


(*Concluded at foot of Col. 1, page 539.*)


*Presented to the South-Eastern Division, N.V.M.A., at Tunbridge Wells, May 9th, 1940.

# Induction of Fertility by the Injection of Gonadotrophic Preparations*

A. S. PARKES, F.R.S.,
AND
JOHN HAMMOND, F.R.S.

## I

DR. A. S. PARKES (*Medical Research Council*).—I propose to discuss briefly the biological basis of the work carried out during the last 18 months on the induction of increased fertility in sheep. Dr. Hammond will deal with its possible application to agricultural practice.

Removal of the anterior pituitary body from an animal causes cessation of reproductive activity. Conversely, if an extract of the anterior lobe is injected into an hypophysectomised or otherwise reproductively quiescent animal then the gonad, particularly the ovary, undergoes stimulation and in many cases ovulation and the formation of corpora lutea results.

It might be supposed that wide possibilities of increasing the fertility of animals were thus opened up, either of increasing the number of ova shed during the normal ovulation period, or of stimulating the quiescent animal. Unfortunately, many difficulties have been encountered in the practical use of gonadotrophic extracts for increasing fertility, and up till recently the results have not been very promising.

The normal ovarian cycle consists of two phases: the maturation and rupture of one or more Graafian follicles, and the subsequent development of a corresponding number of corpora lutea. The first of these phases is correlated with the appearance of willingness to accept the male, and the second with the changes characteristic of early pregnancy. If a crude extract of anterior lobe is injected, in most cases a mixture of these two ovarian phases is produced, and generally the result is chaotic ovarian activity not at all like the orderly changes which normally take place. From the results obtained it seems likely that not less than two anterior pituitary substances are present in the anterior pituitary, one concerned with the production of ripe follicles (follicle-stimulating hormone) and the other with the development of the corpus luteum (luteinising hormone). In crude extracts both of these two substances occur, in varying proportions, and injection of such an extract stimulates the ovary to undergo two phases of development at once, their relative intensity depending on the proportion of the two substances present.

*Qualitative properties of the more important gonadotrophic extracts. — Anterior pituitary extracts* are obtained most easily from the anterior lobes of horse, sheep, pig, and ox. The anterior lobe of the ox contains little gonadotrophic material and that present is largely luteinising hormone. Sheep and pig anterior lobes contain appreciable amounts of material and from them quite active extracts can be obtained. Unfortunately the luteinising hormone appears to preponderate, and it is difficult to produce any orderly stimulation of the ovary of hypophysectomised animals with crude extracts from these sources. On the other hand the extracts of horse pituitary are extremely active and contain a preponderance of follicle-stimulating material; the changes produced by the use of crude horse pituitary extracts resemble those seen in the normal ovary.

*Extracts of blood and urine.*—Two other well-known gonadotrophic preparations are obtained from species in which the body fluids during pregnancy contain very large amounts of gonadotrophic material. The blood-serum of the pregnant mare, particularly during the third month of pregnancy, contains relatively enormous amounts of gonadotrophic material. In women, the urine during pregnancy contains very large amounts of a gonadotrophic substance which is very different in biological action from that found in the serum of the pregnant mare. Whether or not the substances present in the body fluids during pregnancy are elaborated by the pituitary gland is not clear. They may originate in the placenta or in the pregnant uterus.

*Determination of qualitative properties of extracts.*—If the qualitative activity of gonadotrophic extracts is tested on an intact animal there is the theoretical possibility that the animal's own pituitary may contribute to the effect produced, even though the test animal is reproductively quiescent at the time. In practice it has been shown that the effect of the injection of a gonadotrophic extract may be greatly modified by the presence of the animal's own pituitary, which, moreover, appears to be stimulated by the changes artificially induced in the ovary, and contributes to the effect produced.

The degree to which the animal's own pituitary affects the response differs in different species, but it appears to be maximal in the immature female rat, the most commonly used test animal.

*Experiments on sheep.*—These general principles are well illustrated by the work on sheep, and our own investigations have been carried out with horse pituitary extract, which seems to have particularly suitable qualitative properties.

The first experiments, consisting of injecting out-of-season ewes shortly before slaughter, showed that it was possible to produce ovulation during anoestrus by the injection of horse pituitary extract. The number of follicles ovulated was one to three, *i.e.* normal for sheep. Later experiments showed that treatment of sheep during the last three or four days of a normal oestrus cycle caused super-ovulation at the next oestrus. Injection at any other time of the cycle or during pregnancy did not cause ovulation, but merely enlargement of follicles.

*Flock experiments.*—These short-term experiments were followed by work on a normal flock, which revealed several points of importance. If ovulation is induced in an out-of-season ewe it is not usually accompanied by full oestrus, *i.e.* by willingness to mate. It may be necessary to give a second injection after an interval of 16 to 17 days and to cause, therefore,

*Reprinted from the *Proceedings of the Royal Society of Medicine*, Vol. XXXIII, pp. 25-28 (Section of Comparative Medicine), by permission of the Authors and of the Honorary Editors.

horses existed in this country, it could be drawn upon in any emergency for the rapid provision of large quantities of tetanus antitoxin.

REFERENCE

GLENNY, A. T. (1930.) *Brit. med. J.* **2**, 244.

what amounts to one complete artificial cycle, before mating will take place.

Working along these lines on Dr. Hammond's experimental flock in Cambridge last year seven ewes were induced to take the ram out of season, and of these four ultimately produced lambs, the total being seven, giving an average of one lamb per ewe.

II

Dr. John Hammond (*School of Agriculture, Cambridge University*).—There would seem to be a wide application for this hormone in the practical problems of sheep production. The chief applications appear to be as follows :—

(*a*) *To reinforce oestrus in ewe lambs, breeding during their first year.*—Breeders have frequently hesitated to breed from ewe lambs because of the detrimental effect on the ewe herself and because the lamb is often small and weak at birth and the ewe has but little milk. It has been found that the feeding of the ewe during the latter part of pregnancy has a marked effect on birth-weight and milk secretion. By lambing ewe lambs later in the season, about a month after the grass has begun to grow in the spring, these bad effects may be overcome. One good effect of lambing from ewe lambs is that they appear to make better mothers if they produce lambs early in life.

On the average only about 70 per cent. of ewe lambs put to the ram normally become pregnant ; this, however, varies greatly in different flocks and seasons. Tests have been made this last breeding season to find out whether injection at the time they are on heat will increase the number of conceptions ; no results are yet available. In mating up ewe lambs during December and January a certain percentage fail to accept the ram ; these can be injected, as for anoestrous ewes (*see below*), and many have been served during this last season.

(*b*) *To increase the fertility of normal matings.*—Many flocks, especially in certain breeds, give a lower lambing percentage than the optimum, and if this could be increased to about 175 to 200 per cent. it would raise the efficiency of lamb production.

By making the injection a few days before the onset of oestrus, the corpus luteum apparently inhibits ovulation and ripening follicles bank up in the ovary so that when the corpus luteum atrophies and heat appears a large number of follicles are ripe and ovulate. After injections of 50 mgm. horse pituitary extract frequently seven to nine ova are shed, and cases have been obtained in which seven fertilised eggs have been recovered from the tubes and five embryos taken from the uterus at about half-term (Fig. 1.).

Whether it will be possible by regulating the dose to ensure that two follicles only will ovulate has yet to be determined, but it seems likely for there is a marked effect of dose on the number of follicles which ripen in anoestrous ewes.

(*c*) *To breed from barren and lost-lamb ewes during the non-breeding season.*—The ewe has a well-marked breeding season which coincides with the short-day period of the year. The exact duration has not yet been worked out for the different breeds, but with Suffolk × Border Leicester-Cheviots it begins each year about the end of August or beginning of September and ends about the middle of March to the first week in April (Fig. 2, overleaf.). There is considerable individual variation, however, and some ewes go into anoestrus as early as the middle of January ; ewe lambs especially tend to go into anoestrus early.

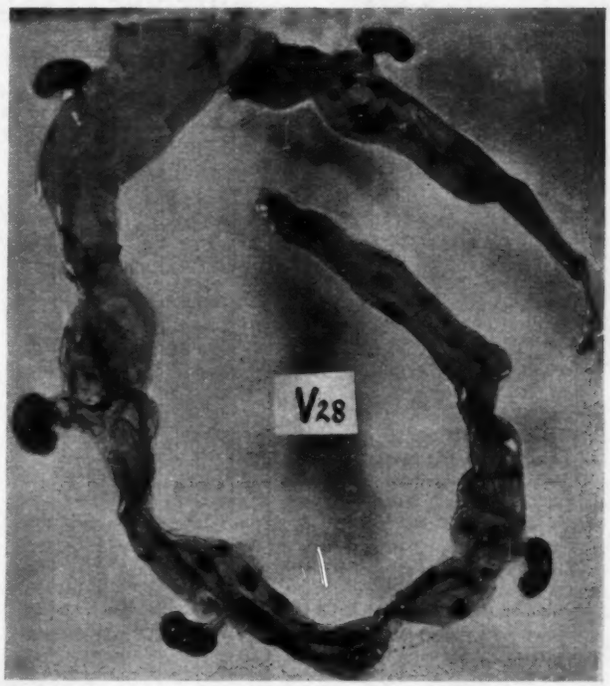



Fig. 1.—Five embryos taken from a ewe that had been injected with 50 mgm. of horse anterior pituitary substance three days before coming on heat.

The number of barren ewes and lost-lamb ewes is considerable, and at present no return, except a wool clip, can be obtained from these for a whole year. If these could be made to breed after the lambing had finished, a crop of lambs could be obtained in the autumn ; thus, by mating after lambing was over in April they would lamb in September.

By injecting 50 mgm. of horse pituitary practically 100 per cent. of such barren or lost-lamb ewes can be made to ovulate in the anoestrous season but no oestrus occurs. An ovulation without an oestrus normally occurs before the onset of the breeding season in sheep and it is not until the second ovulation that oestrus appears. It seems possible that if the ripening and rupture of the follicle is too rapid, as occurs when no corpus luteum is present in the ovary, time is not allowed for the symptoms of heat to develop. Whatever the explanation, the fact remains that by giving a second injection at about 15 to 17 days after the first, the normal duration of the cycle in sheep, both ovulation and oestrus are caused, and mating results in pregnancy. The exact time at which this second injection should be made has not yet been worked out for different circumstances such as breed, time of year, etc.

(*d*) *To obtain two crops of lambs in one year.*—In order to do this the ewes have to be mated while they are still suckling. This is at present being done in some Dorset Horn flocks, a breed which has a much longer breeding season than other British breeds. From work this season it has been found that ewes suckling lambs can be brought into oestrus by the same method as adopted for other anoestrous ewes, although the best interval for the second injection is not yet known. The best interval between lambing and the first injection too has not been determined, although from a practical

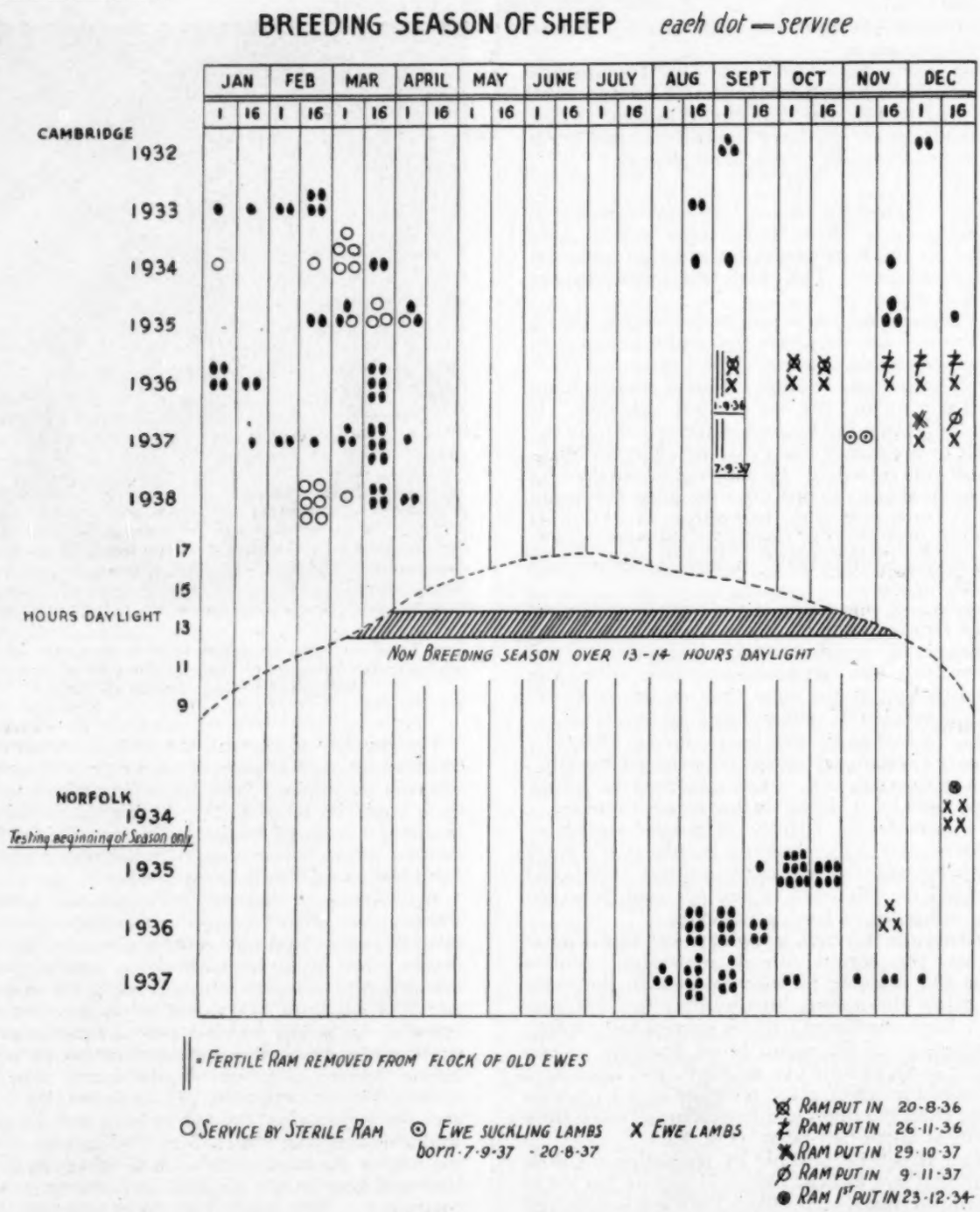



FIG. 2.—Diagram showing the first and last heat periods in the breeding season of a number of Suffolk × Border Leicester-Cheviot ewes. Each dot or mark denotes the first or last heat period of one animal. In Norfolk only the beginning of the breeding season was determined.

point of view it would appear that ewes suckling single lambs born early in the season form the most promising material.

(*e*) *To speed up ewes coming to the ram at the beginning of the breeding season.*—In breeds, such as the Dorset Horn, which cater for the early fat lamb trade, there is often difficulty in getting the ewes to come on oestrus together early in the season, and the lambing is consequently spread out over many weeks. Horse pituitary should be useful in this case, but the details of the method to be employed have yet to be worked out.

In conclusion we have the impression from this season's work that the condition of the ewe may have an effect on the ease with which oestrus is induced in the anoestrous season by injection of the hormone. This seems to fit in with the known fact that flushing or extra feeding of the sheep before the tupping season increases the fertility of flocks (see Table I). It may be that the hormone is dependent for its action in producing oestrus on some nutritive substance.

TABLE I

The effect of flushing the Ewes before the Tupping Season in Scotch Mountain flocks. Group A controls: other groups flushed in different ways (from Marshall).

| | Number of Flocks with Lambing percentages of | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 | 190 |
| Group A ... ... | 1 | 6 | 5 | — | — | — | — | — | — | — | — | — |
| „ B ... ... | — | — | 1 | — | 1 | 1 | — | — | 1 | — | — | — |
| „ C ... ... | — | 1 | 1 | — | 1 | — | — | — | 1 | — | — | — |
| „ D ... ... | — | — | 1 | 1 | — | 1 | 1 | — | — | — | — | — |
| „ G ... ... | — | — | — | — | — | — | 1 | 1 | 2 | — | 1 | — |
| „ H ... ... | — | — | — | — | — | — | — | — | — | 1 | 1 | 1 |

## CHEMOTHERAPY IN TRYPANOSOMIASIS

"The chemotherapy of protozoal diseases in general and of sleeping sickness in particular has been carried a decisive step forward in the brilliant researches described by Professor Warrington Yorke at a recent meeting of the Royal Society of Tropical Medicine and Hygiene.[1] Until 1905, when Thomas[2] demonstrated the action of atoxyl in experimental infections with *Trypanosoma gambiense*, no treatment was known which had any real value against this parasite," states the *British Medical Journal* in a recent annotation. "His observations may be said to have been the starting-point of modern chemotherapy, since they inspired Ehrlich and led to the foundation of the synthetic drug industry. It was soon found, however, that atoxyl, an aromatic arsenical compound, and its early derivatives, despite their unquestionable value, sometimes gave rise to serious disturbances of vision and readily induced arsenic resistance in the parasites. Their action was also very uncertain in the latter stages of *gambiense* infections, and they were of little value at any stage of *rhodesiense* infections. An important advance was the American discovery of tryparsamide, which, as shown by Pearce,[3] is capable of influencing *gambiense* infections even when the nervous system is invaded by the parasites; but it is, again, an aromatic arsenical compound and has all the other disadvantages of these drugs. Further derivatives, such as orsanine, first used clinically by Ledentu and Daude,[4] and neocryl, introduced by Yorke and Murgatroyd,[5] have similar limitations, which appear, therefore, to be inherent in this chemical group. Bayer 205, which is of a different chemical type and is free from many of the disadvantages associated with the arsenical drugs, is also of little practical value in the later stages of sleeping sickness, probably because of its low penetration into the central nervous system. The discovery by Professor Yorke and his colleagues of an entirely new class of trypanocidal agents is therefore of great potential value, and the way in which the discovery was made is of considerable scientific interest. Some 30 years ago Biot, Biot, and Richards[6] observed the importance of glucose for trypanosomes, and attention was focused on the matter when Yorke, Adams, and Murgatroyd,[7] while developing a method for maintaining trypanosomes *in vitro* at 37° C., demonstrated how great was the amount of sugar utilised by the parasites. The effect of hypoglycaemia-producing substances in animals experimentally infected with trypanosomes was examined by N. and H. von Jancso,[8] who found that synthalin exerted a definite therapeutic effect. The correct interpretation of this observation was given by Lourie and Yorke[9] when they showed by *in vitro* investigations that synthalin was in itself directly and powerfully trypanocidal. Synthalin consists of two guanidine groups connected by an alkyl chain of ten carbon atoms, and as this structure differed so widely from that of any known trypanocidal agent, King, Lourie, and Yorke[10] prepared and investigated a number of related derivatives, such as guanidines, isothioureas, amidines, and amines connected by alkyl or alkylene chains of varying lengths. One of the diamidine compounds, 1:11-undecane diamidine, was exceptionally active against trypanosomes, and was also active against malaria. Shortly afterwards Ewins prepared a series of related compounds in which the central inert carbon chain was replaced by aromatic linkages. Certain of these preparations, and in particular 4:4′-diamidinostilbene, have very remarkable therapeutic properties. Not only are the aromatic diamidines active against experimental infections with trypanosomes but they exert a definite therapeutic effect on babesia, leishmania, and certain malarial infections. Clinical trials against sleeping sickness and kala-azar have already been instituted, and the preliminary results are not unhopeful, especially when it is remembered that the compounds at present being used are only the first of a chemical series which may be modified still further."

(1) *British Medical Journal.* (1940.) 1. 410.
(2) *Proc. roy. Soc.*, B. (1905.) 76. 589.
(3) *J. exp. Med.* (1921.) 34. Suppl. 1.
(4) *Ann. Inst. Pasteur.* (1926.) 40. 830.
(5) *British Medical Journal.* (1936.) 1. 1042.
(6) *C. r. Soc. Biol.*, Paris. (1911.) 71. 369.
(7) *Ann. trop. Med. Parasit.* (1929.) 23. 501.
(8) *Z. ImmunForsch.* (1935.) 86. 1.
(9) *Ann. trop. Med. Parasit.* (1937.) 31. 435.
(10) *Lancet.* (1937.) 2. 1360.

* * * * *

## WHEY FOR PIGS

All forms of edible waste must be put to the fullest use now that a further drastic cut in feeding stuffs, particularly for pigs and poultry, is in prospect. Whey is one of the by-products that could be used more extensively. It is not so nutritious as skimmed milk, but its value for feeding, especially to pigs, is beyond question. Whey is rich in milk sugar (lactose). It also contains most of the mineral salts of milk, such as calcium, which are particularly valuable and not easily obtainable in other feeding stuffs. When given to pigs it should be as fresh as possible, and as much as 2½ gallons per head per day may be fed.

* * * * *

Mr. R. S. Hudson, Minister of Agriculture, told the War Agricultural Executive Committee of Cumberland that pastoral districts in safety zones will be expected to accommodate livestock from districts now scheduled as defence areas. The slaughter of stock will come only as a last resort.

* * * * *

Dr. Wm. Robinson, of the U.S. Department of Agriculture, who in 1935 discovered that the healing effect of maggots in a wound is due to allantoin excreted by the parasites, and later that solutions of urea have the same effect, has made the further discovery that a much simpler compound, ammonium bicarbonate, is equally efficacious in promoting wound healing.—*Vet. Med.*

THE VETERINARY RECORD
July 27th, 1940.

# FERTILITY IN EWES

BY the intelligent application of knowledge gleaned from careful observation and research, man strives continually to harness the great potentialities of nature and direct them into channels most remunerative to himself. In the agricultural sphere he has discovered the advantages of selective breeding and thereby developed strains of cattle which produce more milk or mature more rapidly than did their ancestors. He has increased the egg-laying capacity of the domestic fowl and raised the fertility level of the pig. As far as sheep are concerned the practice of breeding for wool or for mutton quality is nothing new. Parkes and Hammond, whose work is published elsewhere in this issue, now suggest that there are prospects of increasing the fertility rate of ewes by selective breeding.

It has been found possible to produce oestrus out of season and if pituitary extract is injected a few days prior to the normal onset of heat superovulation can be induced. There appear to be many occasions when the use of such extracts would seem to be highly beneficial—as, for instance, with tegs, whose fertility rate is generally lower than that of older sheep, or with barren ewes. But the prospect of producing and rearing three or more lambs per ewe is one which, though it might seem highly advantageous, may in practice have its drawbacks.

There are few shepherds who welcome triplets, but many who claim that there is good profit in a single, which receives certain obvious advantages over members of a larger family. It may be, however, that the most serious obstacle to the success of any scheme to raise the fertility level, at least in this country, will be the accentuation of the condition known as pregnancy toxaemia, which is a ketonaemia.

Already a large percentage of flocks only just survive the winter on a bare subsistence diet when, as was clearly shown this year, it only requires a spell of bad weather to upset the balance of metabolism and cause heavy losses. With three foetuses there would appear to be danger ahead for they are likely to be a greater drain on the maternal metabolism than two.

As the experienced husbandman becomes increasingly aware, exploitation has its limitations. He may produce better and still better strains of milking cows and be willing to put up with milk fever and lactation tetany. He may also keep two animals where originally only one could exist and run the risk of possible loss from parasitic infestation, but before any new venture, especially of a biological nature, which appears to make for economic improvement is undertaken all the relevant factors should be weighed carefully.

## CLINICAL COMMUNICATIONS

### A Case of Chylous Cyst

C. B. DAVIDSON, M.R.C.V.S.
Royal (Dick) Veterinary College, Edinburgh

This case is recorded in some detail because, as far as I can gather, it appears to be unique.

Subject.—A cross-bred male Pomeranian, 10 years old, in poor condition.

History.—The owner complained of husky breathing in the dog, which condition had been present for at least three months, and was gradually getting worse. The breathing had become much more difficult in the last month especially, and there were periods of greater intensity of the symptoms. The dog ate normally and enjoyed his food.

General Examination.—Temperature was 103° F., the pulse weak and accelerated, some heaving at the flanks. The most pronounced symptom was the noise made at every inspiration. Breathing was very difficult, slightly accelerated and laboured. The sound appeared to be laryngeal on inspecting the dog, but there was no observable lesion beyond a slight congestion of the pharynx. A slight, soft cough was given occasionally.

Physical Examination.—*Palpation*: negative.

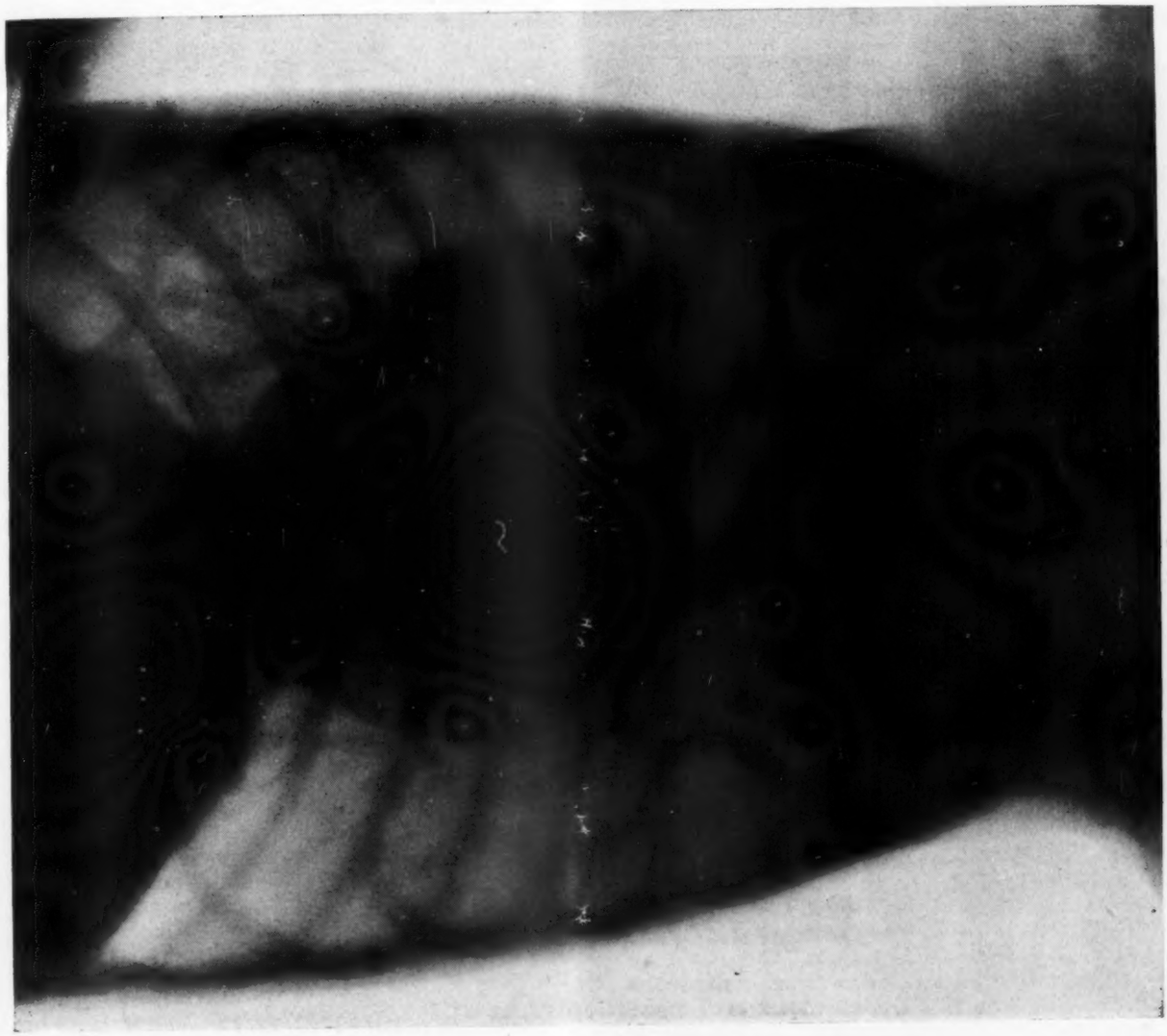
*Percussion.*—A small area of doubtful dullness on the right side and immediately behind the scapular border about the middle of the chest.

*Auscultation.*—On the right side of the chest the sounds were loud and harsh, giving the impression of air being forced through a partially obstructed air-way. The left lung sounds appeared normal, but they were so slight that the sounds from the right lung largely obscured them.

Diagnosis.—Tentatively it was thought that the condition might be due to an enlarged mediastinal lymph gland; it was, therefore, decided to take an X-ray film. Two distinct shadows were seen. One was smaller and more dense and placed more anteriorly in the chest; this was the heart shadow. The other was much larger and less dense, and was the adventitious shadow, for it extended too far back in the chest to be even an enlarged pericardium. On the X-ray film it was seen that the two shadows covered one another to some extent, and even the lighter one was well circumscribed. The bronchial shadows seen in several places were due to their fluid content. The owner was informed that nothing could be done for the dog, and permission for its destruction was obtained.

Post-mortem Examination.—The abdomen was emptied, the diaphragm removed with all care. The ribs were next cut through at the junction of the upper and middle thirds, and lifted off with the sternum after carefully dissecting away the ligament of the pericardium. The new growth could then be seen in its entirety. It was about the size of an orange, entirely within the mediastinum; its posterior boundary was rather pointed and touched the diaphragm. Anteriorily it was in close connection with the base of the heart. Laterally the lungs were in close apposition to it. The heart was pushed over to the left side. The right lung was slightly congested and the left lung emphysematous. The contents of the

C. B. DAVIDSON: CHYLOUS CYST



N. S. BARRON and A. C. FRASER :
TETANUS IN LAMBS

chest were next dissected out together with the trachea and larynx. Whilst doing this it was noticed that the aorta was pushed to the left, and the oesophagus was closely pressed up against the dorsal wall of the chest. Palpation of the growth gave a fluctuating feeling. The bronchial glands were also affected, but to a much less extent, and were found in the entrance to the chest. They had the appearance of being cystic.

At this point it was suggested that the case might be one of hydatid cysts, which are common in the human being, or it might be an adenocarcinoma, but it was felt to be too soft for that. The cyst was opened and from it poured a fluid like thick cream soup, which was greasy to the touch and glistened somewhat. Some of the fluid was used to prepare a specimen for microscopical examination, and it was found to be very rich in crystals of an envelope shape, this being the characteristic shape of cholesterin crystals.

Sections were prepared from the wall of the cyst. These revealed a thick fibrous capsule, on the inner side of which large numbers of typical cholesterin crystals were embedded.

No attempt could be made to dissect out the chylous duct, because of the cyst and enlarged glands, but this at any time is a difficult operation even in the normal subject.

On looking up the veterinary literature available, I can find no mention of just such another case.

* * * * *

## Tetanus in Lambs

N. S. BARRON
and
A. C. FRASER

Outbreaks of tetanus in ruminant animals are rare compared with the number recorded as occurring in the horse. This state of affairs may be explained by the observations of Ramon and Lemétayer[1, 2] who demonstrated the presence of appreciable quantities of tetanus antitoxin in the sera of cattle, sheep and goats which had never suffered from an attack. The quantity moreover increased with age. It is suggested that conditions in the stomach of ruminants are suitable for the production of limited amounts of toxin, the absorption of which later results in the presence of antitoxins in the blood (not found in man and the horse). According to Urbain *et al.*[3] sheep and goats are, however, more susceptible to the action of toxin than horses. Watts[4] found *Cl. tetani* to be present in the rumen of five out of 32 sheep examined, a percentage in keeping with the observations of workers in other areas.

The cases of tetanus infection in lambs recorded in this communication were brought to the notice of the authors during the last two lambing seasons.

Outbreak No. 1. *History.*—Three lambs only were affected out of a total crop of 65. When six weeks old they were tailed with a hot iron and two weeks later developed stiffness in the hind quarters. The lambs lived for two weeks without any food and when seen still had scabs on their tails but no evidence of pus formation. It was recorded that two years previously a heifer had died of lockjaw on this farm.

Outbreak No. 2. *History.*—Two lambs only were affected out of a total crop of 22, and about a similar number had died in the previous two years. Cases occurred two to three weeks after docking in a similar manner to the lambs in outbreak No. 1.

Outbreak No. 3. *History.*—Nine of the best-conditioned lambs out of 450 had died, some before docking with a hot iron and others afterwards. The owner stated that in previous years, when he had tailed without cautery and allowed bleeding to take place freely, no further cases had occurred after this operation.

*Symptoms.* — The first indication of infection appeared to be an increased nervous sensitivity combined with a stiffening of the hind quarters. Within 24 hours symptoms became exaggerated, the entire frame tensed and the limbs stretched out so firmly that joints could be flexed only with great difficulty.

The neck was stretched and the head thrown back as noted by Moine[5] in cattle, the ears were pricked, the membrana nictitans exaggerated though not prominent and the eye partially rotated (see photo). After a few days frothing at the mouth began. Light and sound served only to aggravate the symptoms. By holding the fetlocks of the legs on one side the animals could be lifted like a board.

*Treatment.*—On the grounds of expense it did not seem economic to use anti-tetanic serum and in outbreaks 1 and 2 efforts were made to keep the lambs alive by feeding warm flour gruel from a bottle. This did not prove very successful, however, the lambs developing pneumonic symptoms and dying in about four days.

At the suggestion of Fraser 50 c.c. of 5 per cent. solution of magnesium sulphate were injected subcutaneously into a number of the more severely afflicted animals. Respirations in two cases rose from 60 to 200 and to 140 respectively in five minutes, and in ten minutes relaxation was complete. The limbs could easily be flexed and the lambs would suckle a finger or swallow a little milk. Relief lasted for eight to ten hours when further injections could be given. By repeated treatment and hand feeding some lambs were saved though the procedure can hardly be recommended as being very practical.

Remarks.—The relaxation which followed the injection of 5 per cent. magnesium sulphate was very remarkable. Hebeler[6] records the subcutaneous injection of saturated magnesium sulphate in a heifer, but without success. In the horse, however, according to Vögele[7] intravenous injections of magnesium sulphate and glucose dissipate symptoms, relieve pain and are likely to lead to recovery. In all the cases recorded above enquiry elicited the information that deaths had occurred in previous years showing that the premises were infected. The lamb, it would seem, is exposed to infection under these circumstances before it has begun to ruminate and therefore develop any degree of immunity.

In outbreaks 1 and 3 samples of blood were taken from lambs showing advanced symptoms and examined for toxin content. Only in the latter instance was toxin found in a low dilution. We would like to thank Dr. Montgomerie for kindly undertaking this work.

Our thanks are due also to Mr. Maurice Kirk, of Bicester, for bringing to our notice outbreaks 1 and 2.

References

[1] Ramon and Lemétayer. (1933.) *C. R. Soc. Biol. Paris.* **112.** 1157.
[2] —— and ——. (1934.) *Ibid.* **116.** 275.

(*Concluded at foot of Col.* 1, *page* 546.)

# ABSTRACTS

**[HEPATIC CIRRHOSIS OF HORSES, SWINE AND CATTLE DUE TO THE INGESTION OF SEED OF TARWEED.** McCulloch, E. C. (1940.) *J. Amer. vet. med Ass.* **96.** 5-17. (18 refs., 12 illus.).]

The seeds of tarweed (*Amsinckia intermedia*) when present in wheat screenings, etc., are palatable to domestic animals and are toxic for horses, swine and cattle, causing an enzootic hepatic cirrhosis. The condition is known as " walking disease " in horses because of the predominant nervous manifestations, and as " hard liver disease " in cattle and swine in which the main symptom is general unthriftiness. Rabbits, rats and fowl appear immune, and sheep are either immune or highly resistant. Apparently the toxicity of the seeds varies from year to year and with soil, climate, variety of the plant and stage of maturity at harvesting. Available data indicate that considerable amounts of the seed must be fed before symptoms are produced, but the disease is chronic and it is probable that the condition has escaped notice in areas where few farms are sufficiently heavily infested with the weed to make the screenings capable of producing fatal results. Also as sub-lethal doses in swine produce similar symptoms to those of parasitism this may be a mistaken diagnosis.

The author describes the field and laboratory investigations, and the pathological findings in the condition, the most striking feature of the latter being an extreme destruction of hepatic tissue and its replacement by fibrous tissue. The toxic principle has been isolated in alcoholic extracts of the seeds of *A. intermedia* and efforts are being made to determine its chemical nature.

A. E. K.

* * * * *

**[TREATING HORSE-STABLE MANURE WITH STEAM TO KILL PARASITE EGGS AND LARVAE.** Lucker, J. T. (1940.) *J. Amer. vet. med. Ass.* **96.** 188-194.]

It is generally agreed that if an open manure heap is to be sterilised (*i.e.*, the vitality of the nematode eggs or larvae in the manure destroyed) with reasonable efficiency by the heat generated within it much care and labour are necessary in the proper building up of the heap and the subsequent turning in, periodically, of the outer layers. Similarly, chemical methods of sterilisation require considerable work, money and time to be successful. As a rapid method is desirable, Lucker has carried out a series of tests involving steam heating to find the optimum conditions necessary for complete, as opposed to partial, sterilisation. He describes in detail, and with the aid of diagrams, the equipment used in the series of experiments in which stable manure was steamed in different closed, insulated boxes provided with coils of perforated pipe for steam distribution. A 3-horse-power boiler was used to generate steam in all experiments, and the methods of controlling the duration of the steaming process and the procedure in determining the effects of the treatment on Strongyle eggs and larvae in the faeces are detailed.

In a preliminary test, using a box of 12 cubic feet capacity as container for the manure, effective steam treatment of 30 to 35 minutes with a maximum boiler pressure of 15 lb., or of 15 to 25 minutes with a maximum boiler pressure of 25 lb., destroyed the vitality of all Strongyle eggs and larvae. In boxes of about 145 cubic feet capacity, the boiler horse-power was insufficient, even in warm weather, for dependable rapid and complete sterilisation. Steaming from 1½ to 6½ hours killed practically all larvae and eggs located centrally in the boxes but usually did not kill those in the manure near the sides and corners of the boxes and no satisfactory index for control of the duration of treatment was forthcoming from the experimental data.

In a box of about 91 cubic feet capacity, the effective steaming time varied from 10 to 35 minutes. The tests were controlled by a single, inexpensive, industrial type of temperature guage entering one side of the box near the bottom, and a temperature of 95° C. at this point was regarded as initiating the effective treatment. Ascarid eggs present in the manure in two tests were also killed by the steam treatment and tests in this medium-sized box were successfully carried out in nearly freezing weather.

J. N. O.

* * * * *

**[THE OPERATIVE TREATMENT OF COENUROSIS IN CATTLE.** (Trans. title.) Buchlmann, E. (1939.) *Tierärztl. Rdsch.* **45.** 729-732.]

It is a curious thing that coenurosis is quite common in young cattle in Pinzgau and Pongau in the Ostmark, Germany, whilst it is unknown there in sheep and is only occasionally observed in goats.

The author gives a good clinical description and describes his operative treatment. The earliest symptoms include unsteadiness, turning in one direction, followed by wasting, which is due to the animal's inability to walk up to food and water supplies. The general attitude is one of sleepiness. When all these signs are present, but not before, it is time to operate, for the cyst has reached the surface of the brain.

Diagnosis is based on the history and the result of percussion over the brain with a light lead-faced percussion hammer made of hollow steel tubing. Tapping over the cyst causes a variation in note.

The site for operation lies 2 cm. above a line joining the upper boundaries of the orbits and 1 cm. from the mid-line. Local anaesthesia is used. The skin is incised, the periosteum divided and retracted to allow room for the special boring tool which resembles a broad bradawl capable of making a hole up to 1 cm. in diameter. This is preferred to a trephine which removes too much bone.

The cyst is picked out carefully by a suitable hooked probe and the fluid removed by suction. No suture is applied : the skin around is merely covered over by adhesive plaster. Progress towards recovery is already evident a few hours after operation.

J. E.

---

[3] Urbain, Bullier, Nouvel and Kowarski. (1936.) *Ibid.* **121.** 708.
[4] Watts. (1938.) *Brit. J. exp. Path.* **19.** 442.
[5] Moine. (1936.) *Rec. Méd. vét.* **112.** 7, 397.
[6] Hebeler. (1940.). *Vet. Rec.* **52.** 19, 369.
[7] Vögele. (1939.) *Z. Veterinärk.* **51.** 279. (Abstr. *Vet. Rec.* **52.** 288.)

## REPORT

**[ISLE OF MAN:** Report on Animals, the Administration of the Cattle Diseases (Prevention) Acts, the Cattle Subsidy Schemes and Agricultural Statistics for the year 1939.]

This Government publication relates to livestock generally on the Island, agricultural statistics and the various classes of stock imported and exported. It also contains a section dealing with the Administration of the Cattle Diseases (Prevention) Acts during 1939 which is of much interest to veterinarians.

The Government Veterinary Inspector is responsible for the examination of animals suspected to be affected with disease, the examination of animals prior to exportation from or immediately on importation into the Island, market inspection, the examination of stallions and bulls intended to be licensed under the Horse Breeding Act and the Cattle Breeding Act, the supervision of livestock belonging to the Board of Agriculture and the Mental Hospital Board. He also acted as Certifying Officer under the Cattle Subsidy Scheme.

No case of swine fever has occurred in the Island since 1936, parasitic mange since 1937, or foot-and-mouth disease since 1883. The incidence of tuberculosis in cattle can be assessed from the information given of cases found and slaughtered under the Tuberculosis Order. Out of a total cattle population of 20,072, of these 6,457 being milch cattle, 106 animals were slaughtered under the Order and 94 were classed as advanced on *post-mortem* examination, ten as not advanced and two not affected.

Of 526 milk samples submitted for biological examination by the Local Government Board and 185 samples by the Douglas Corporation, 22 were reported to be infected.

The number of cattle imported into the Island during 1939 was 368 against 1,164 in the previous year and 264 exported against 74 during 1938. Dealing with the Island's exports, it is stated in the report that of a total of 186 cows exported from the Island to Great Britain in 1939, none were detained at the landing place in Great Britain as coming within the scope of Article 10 of the Tuberculosis Order 1938, and all sheep exported from the Island during the last nine years were found to be free from sheep scab, and for the sixth year in succession, no case of sheep scab was discovered in the Island. Two hundred and eleven sheep dippers were licensed in accordance with the provisions of their sheep scab Order. All cattle imported and exported which were found to be affected with warble fly larvae were dressed with a suitable dressing at the Government lairs prior to removal.

The number of cases of generalised tuberculosis in cattle and swine found at the various slaughterhouses in the Island, also the number of cases of mastitis, contagious abortion, actinobacillosis, ringworm, etc., found on the examination of cattle are recorded.

The total head of animals of all kinds in the Island in June, 1939, on 1,189 agricultural holdings was 127,176, consisting of 3,707 horses, an increase of 166 on the previous year; 20,072 cattle, an increase of 723; 98,704 sheep, an increase of 3,414; 4,693 pigs, an increase of 593. The total head of animals imported was 583 and exported 6,298.

W. T.

## ROYAL COLLEGE OF VETERINARY SURGEONS

### Membership Examinations, 1940

LIST OF SUCCESSFUL CANDIDATES

(*Continued from page* 534)

#### Edinburgh

FIRST YEAR:

Coupland, A. M. T. (C)
Cowie, R. S. (C)
*Cragg, D. A.
Davie, John
*Duncan, L. J. P.
Fennell, C.
*Ferguson, G. S.
Field, John (C)
Geary, T. C.
*Gibson, G. Mc.
*Gunstone, J. W.
*Jobling, R.
†Latimer, G. E. M.
*Latham, J.
Mackellar, J. C. (C)
*MacLennan, K. J. R.
*Moody, F. C.
Nisbet, D. I. (C)
Oxley, H.
*Salisbury, N.
Scott, H. M.
Snodgrass, N. (C)
*Stephenson, F. D.
Stewart, James
Stirling, John (C)
Temiyachol, P.
*Thomas, P. D. I.
Vickers, T. A.
Walker, J. A. G.

†Denotes First Class Honours.
*Denotes Second Class Honours.
(C) Denotes credit in Chemistry.

SECOND YEAR:

Anderson, G. W.
*Bayliss, John
Beattie, I. S. (H)
*Bell, R. L.
Brown, David
Bruce, Wm. (H)
*Cameron, J. A.
Clark, H. R.
Conn, W. B.
*Commbs, R. R. A.
Cox, R. L.
Dawson, C. D. (H)
Dougill, J. (H)
Donald, D. E. (P)
Dovey, J. S. (H)
Dymock, W. H.
*Garside, P.
*Geary, John
Gibbs, J. R. (P)
Girvan, R. F.
Hamilton, H. A.
*Lindley, P. E.
*McCormick, W. J. M.
McIlroy, G.
McIntyre, W. I. M.
Mackay, Allan
MacKinnen, M. M. (H)
Maclachlan, G. K. (P)
McMillan, F. H.
Machin, J. H.
Mason, A. D.
*Melrose, D. R.
Muir, J. (H)
Parameswaren, K.
Park, R. C.
Philip, J. G. (P)
Pottinger, F. H.
Shilliday, E. A.
Smith, G. F.
*Spence, Tom
Stead, P. Y. (P)
Stuart, Peter (P)
Walker, I. A. (H)
*Watson, A. H.
Wauchob, R. D.
Whitney, E. W.
Wishart, G.

*Denotes Second Class Honours.
(P) Denotes credit in Physiology.
(H) Denotes credit in Histology.

THIRD YEAR:

Bargh, G. R.
Bowie, D. D. P.
Brotherstone, J. G.
Campbell, J. A.
Colson, H. W.
Comline, R. S. (A)
Crichton, D. R. V.
Gammack, K. C.
Gillespie, A. C. (P) (A)
Grant, J. G. D.
Greig, W. A.
Hamilton, James
Harper, W. O.
Hogg, A. H.
Holmes, G.
Hughes, E. E.
Hunneford, J. N.
Hutchinson, R. A.
Inglis, J. W. C.
Keswani, D. G. (A) (H)

(P) Denotes credit in Pharmacology.
(A) Denotes credit in Anatomy.
(H) Denotes credit in Hygiene.

THIRD YEAR—*contd.*

Lang, J.
Longley, R. F.
Macdonald, D. W. (H)
McGirr, J. L. (P) (H)
Maclennan, D.
Marshall, W. S.
Massey, R.
Mulki, F.
Newsam, T. J.
Oliver, D. F. (H)
Parker, W. H. (A)
Smith, James
*Stenhouse, W. E.
Tait, W. (P) (A)
Wolfe, T. B.

*Denotes Second Class Honours.
(A) Denotes credit in Anatomy.
(H) Denotes credit in Hygiene.

FOURTH YEAR:

Agnew, J. H.
Aylward, B. G.
Bannister, D.
Cloke, J. N.
Coles, N. D.
*Cruickshanks, John
Davis, R. H. K.
Deas, D. W.
Dixon, E. (Path)
Douglas, R. A.
Flodin, P. M.
Ford, M. P.
Garfitt, C. R.
Halcrow, R. G. (Paras)
Heath, G. B. S.
Irwin, S. A.
Johnson, J. E.
Laing, J. A.
Lamont, A. A.
Loughran, J. D.
McCormac, S. F.
Macdonald, Donald
McGowan, D.
Mackenzie, H.
McKinnon, D. J.
Millar, P. G.
Milne, F. J.
Ord, G.
Owen, D. W.
Pattison, I. H. (Paras)
Pook, H. L.
Powley, G. S.
Robertson, A. I.
Sinclair, D. F.
*Stamp, J. T.
Wilson, P.
Wood, R. I. (Paras)

*Denotes Second Class Honours.
(Path) Denotes credit in Pathology.
(Paras) Denotes credit in Parasitology.

FINAL YEAR:

Alton, G. G.
Bassett, C. S.
Birkett, J. D.
Birtwhistle, J. F.
Blackburn, P. S.
Blanchard, Wm.
Britten, A. F. F.
Brown, G. F.
Cameron, J. M.
Chester, W. R.
Choudary, C. V. G.
Christie, David
Conn, E.
Constance, L.
Corr, Raymond
Dixon, R. J. H.
Farrant, V. D. C.
Gibson, T. G. E.
Hebeler, H. F. C.
Jones, Stanley
Lambert, A. L.
McDiarmid, A.
McPherson, E. A. (S)
Milburn, W. B.
Millar, J.
Pullon, I. B.
Rennie, J. D.
Robarts, D. L.
Steel, H. B.
*Stuart, J. D.
Taylor, G. R.
Twizell, C. W.
Watson, J.
Watt, J. A. A.
Wilkinson, Harry
Williamson, J. M.
Wilson, J. G.
Wood, D. W.
Ziffo, G. S.

*Denotes Second Class Honours.
(S) Denotes credit in Surgery.

**Glasgow**

SECOND YEAR:

Boyd, J. A.
*Brocklehurst, F. B.
*Brown, A. C. L.
*Bryson, R. W.
Buchanan, W. G.
Buntain, David
Caldwell, W. A.
Clow, D. G.
Coats, W. A.
*Cooper, Miss M. B.
Corrie, J. W.
Craig, John
Dewar, H. D.
Duncan, T.
Fraser, J. R.
Gaston, Miss D. A.
Gregor, Alec.
Howie, T. W. T.

*Denotes Second Class Honours.

SECOND YEAR—*contd.*

Leslie, Miss M. G.
McCallum, F. J.
Mackay, A.
Mackenzie, G. J.
McLelland, Miss R.
Morton, A.
Noble, N. (P)
Normand, Miss J. G.
Pfob, L. S. (P)
Pickney, Miss J.
Rankin, W. L.
*Serth, G. W.
*Sillars, D.
Smart, T. W. H.
*Stewart, Wm.
Sumner, K. C.
*White, Miss P. M.
*Wilson, R. M.

*Denotes Second Class Honours.
(P) Denotes credit in Physiology.

FOURTH YEAR:

Anderson, A. C.
Auld, R.
Brown, J. (Airdrie)
Caldwell, W. D.
Cassells, J.
Crerar, Wm.
Crosbie, Andrew
Ferguson, C. M.
Galloway, J. D.
Harris, G. W.
Macleod, F. P.
Naismith, J. A. A.
Rankin, J. D.
Semple, Wm.
Swanney, J. M.
Twiss, A. F.
Wilson, J. C.

FINAL YEAR:

Burrows, Wm.
Burton, Miss I. W.
Chowdhary, B. N. S.
Ferguson, Miss J.
Gray, P. M.
Hempstead, F. J. D.
Lang, Wm.
McCorkindale, J.
McCulloch, John
Macleod, D.
McMillan, M. M.
Mactaggart, A.
Morrison, A. M.
Murchison, M. M.
Stewart, R. D.
Straiton, E. C.
*Wilson, Andrew

*Denotes Second Class Honours.

## IN PARLIAMENT

### Department of Agriculture, Scotland

On Wednesday of last week, with the House of Commons in Committee of Supply on a vote of £304,527 for the salaries and expenses of the Department of Agriculture in Scotland, Mr. E. BROWN, Secretary of State for Scotland, said that the adjustment of our home production to the essential needs of our people—to be assessed in the light of the best scientific knowledge—required a comprehensive adjustment of our farming economy, and that was the basic war fact.

The Secretary of State continued (in the course of his speech): "The whole organisation of the Agricultural Department of Scotland was turned in a day into a war production machine, and the whole resources of Scottish agriculture have been devoted to the supreme task of contributing to victory. As the Committee knows, the main instruments of our war-time policy in Scottish agriculture are our agricultural executive committees. As soon as the committees were constituted they were invested with powers. There are two principal powers, the first of which is to give directions with respect to the cultivation, management and use of agricultural land; and the second, with the consent of the Secretary of State, to take possession of land or control the tenancy of land in suitable cases. Their first task, of course, was to secure increased cultivation and production of crops. With the assistance of parish or district sub-committees, they proceeded at once to make a survey of the farms in their districts. The greater part of this work was completed by the end of the year, and the work of issuing formal directions to farmers requiring the ploughing-up of agreed or selected fields was then proceeded with.

In some cases it proved to be necessary for the committees to exercise, with my consent, the power to terminate tenancies and to take possession of agricultural land which was not being cultivated at all or not being cultivated according to the rules of good husbandry.

"With these powers in reserve, agricultural executive committees have been active in co-operation with the owners and occupiers concerned in arranging for the grazing of cattle and sheep on golf courses, deer forests and grouse moors. Already encouraging progress has been made. Golf clubs made a ready response to the call to graze sheep on their courses, and recent returns show that, compared with last summer, the deer forests are now carrying over 1,050 more cattle and 24,000 more sheep—an increase of 66 per cent. and 50 per cent. respectively. Of course, much more remains to be done. The Scottish Land Court are at present carrying out surveys of the deer forests in some of the northern counties. This is being done with a view to ascertaining the numbers of sheep and cattle that could be carried on these forests, and I am much indebted to them for giving this help. The survey for Ross-shire is already complete, and further surveys will follow. They will form the basis of further action by the committees, and if in any case it should appear that the national interest requires that possession should be taken of forests to secure their full pastoral use I shall not hesitate to authorise the necessary action.

"There is another direction, however, in which progress might be made, and I hope will be made, towards more effective use of the 10,000,000 acres of rough grazings in Scotland. A large proportion of this land outside the deer forests is in the occupation of hill sheep farmers. The land has deteriorated owing to the impossibility of finding from the industry enough return to pay for adequate reconditioning. It cannot, therefore, carry as much stock as it did, and so the returns diminish. My Department recently asked some members of the Advisory Council to look into this, and I am now examining with great care the suggestions that they have put forward. The most important is that a great deal of this land could be improved and the returns from it increased if there were more cattle on the hills. Cattle increase fertility and keep down bracken. I have little doubt that, given reasonable price levels, it will be greatly to the advantage of the sheep farming industry if the former combinations of cattle and sheep can be restored. Hon. Members will realise, however, that the reconditioning of hill farms in this way would be a slow business, and would not greatly affect our immediate food production policy.

"Let me make it quite clear at the very beginning that it must be obvious, in view of the nature of our Scottish farming system, that a further substantial increase in the tillage area can best be achieved by ploughing up more of the rotation pasture land. We must frankly realise that this will involve an upset of the present, or normal, balance of Scottish agriculture. This is inevitable, and it calls for no apology. The change now required implies the utilisation of a greater proportion yet of good arable land for the growing of food crops rather than the production of mutton and beef."

In debate, Mr. Mathers said that, with regard to deer forests, all hon. Members were glad to hear that there were some thousands of cattle and 24,000 more sheep on land which had hitherto been looked upon as being devoted entirely to deer. That number of sheep was a considerable one, but it was not anything like the number which it ought to be possible to rear in that vast area which is looked upon as deer forest. He thought he would have the support of the Committee in pressing those who could do it to carry out the restoration of mixed cattle and sheep farms on hill land, bringing more land under cultivation, making it more fertile, and causing it to carry a greater number of cattle and sheep. In reference to the poultry industry, which was in a state of decline at the present time, he knew that orders had gone forth that the stocks of poultry must be cut down. It seemed to him that the right hon. Gentleman's statement about cattle stocks also having to be depleted might possibly show a way of preserving a certain number of poultry as a result of the food that would be saved by doing away with the cattle stocks. The poultry industry was one into which a very large number of small people had put all their savings, and undoubtedly the present tendency would hit them very badly.

### Veterinary Education

Colonel Sir Charles MacAndrew said that, with regard to the report of the Department of Agriculture, there were two points which he would like to bring before the notice of his right hon. Friend. "The particular chapter in which I am interested," continued the hon. Member, "is the one regarding agricultural education, research and development. In that chapter there is a quotation from the Committee on Veterinary Education in Great Britain, a committee which was set up by his predecessor in 1936 and which reported two years ago. They say that in their view:—

> "The State has not contributed liberally to the training of the profession and that veterinary education has been starved."

That may be true, but in that chapter I do not see a single word about the extraordinary generosity of the Racecourse Betting Control Board. I happen to be a member appointed by the Secretary of State for Scotland. They talk about not receiving money, and when they are very well treated they have not the courtesy to say "Thank you." We have a very large sum—about £125,000—to disburse, and if they are polite, they may get some more money; if they are not polite, they may not. I would like to give some figures for 1938, because they are remarkable. We gave the following grants: for investigations into grass sickness at Moredun Institute in Scotland, £750; for research into disabling diseases of horses at the Royal (Dick) Veterinary College, £650; the Royal (Dick) Veterinary College, Edinburgh, for their extension fund, £1,000; and we gave the Glasgow Veterinary College £500 towards the purchase of, I think, 40 microscopes. That is a total of £2,900, and out of the total amount of that part of the grant the total was £5,165, which represents 44·9/80. I am glad to have this opportunity of bringing these figures before the Committee, because I believe the Control Board has behaved very well indeed towards Scotland, and I wish the Treasury would take a leaf out of their book. With regard to the report of the committee to which I have referred, there is one recommendation which they give and on which I would like to comment before I resume my seat. That refers to training in animal husbandry. The report says:—

> "The Committee recommend that a pupilage of at least six months on a farm at varying seasons of the year should be required of students as the foundation of a more practical training in animal husbandry."

I think that is excellent, but they go on to say:—

> "For this training a Field Station of about 100 acres, at which the different kinds of farm livestock are kept, should be attached to each school."

With that I most heartily disagree, for this reason. It is not so much my own idea as that of a very experienced veterinary surgeon in Ayrshire, a friend of mine, who has a son who is studying to be a veterinary surgeon. He sent him to work on a farm. I would like the right hon. Gentleman's attention for a moment, because I believe that this is important. They recommend that this should be done, and my reason for thinking it should not be done is this: If field stations are set up to train young veterinary surgeons in the treatment of animals, they see animals treated and getting attention in a way which on an ordinary farm it is quite impossible to do. I think it is so important for the young student not only to go

on to a farm and see the work that is done, but also to see in fact how much attention it is possible to give. No doubt, in an experimental place it is possible to do things which it is not always practicable to do on the ordinary farm. Although it is important for the young lads to go on to a farm, it should not be a specialised farm but a general farm for learning the treatment of animals."

After further debate the Vote was agreed to.

* * * * *

### White Bread to be "Fortified"

In the House of Commons on Thursday, July 18th, on a Vote for the Ministry of Food, Mr. Boothby, Parliamentary Secretary to the Ministry, said that with regard to bread, it was well known that nutritional experts had stressed the importance of what was known as the wholemeal variety as compared with white bread. One reason why the manufacture of white flour had not been suspended was that most consumers here preferred white bread.

For reasons of security the Government had not only increased stocks of wheat, but they had also greatly increased the proportion of our reserve which we held in the form of flour. The keeping qualities of white flour were definitely greater than those of high extraction, or wholemeal flour, and the Government, therefore, deemed it essential to keep our flour reserve in the form of white flour.

The main objection to white flour was that it was lacking in the vitamin content to be found in the wholemeal variety. The Government intended to fortify it with the addition of vitamin $B_1$, and also to introduce into the loaf a small quantity of calcium salt. Some months must elapse before sufficient vitamin $B_1$ was available, but when that time arrived the public would have the choice of fortified white bread or wholemeal bread at the same price.

This was a revolutionary step. In conjunction with the milk scheme it would lay the foundation of a nutritional policy which would have a permanent beneficial effect on the health of our people, and would be hailed by scientists all over the world as a great advance on anything hitherto achieved by any country in this field.

The decision to fortify white bread was taken after the report of the Scientific Committee, under the chairmanship of Sir William Bragg, had been received. It was a matter of great satisfaction to the Ministry that their import policy had, to a very considerable extent, been endorsed by the Scientific Committee, but he hoped that their recent successes in the field of nutrition would not go to the heads of the scientists. (Laughter.)

## BLOODSTOCK VALUES

"What the eventual effect of the existing chaos may be upon the breeding of high-class pedigree cattle and sheep, no one can yet guess," observes the *Farming News*. "Meantime, however, it is evident that at least temporary collapse of horse-racing has been seriously reflected from a financial point of view in a staggering fall in the values of bloodstock. Here is a very striking instance of it. It is announced that the Aga Khan, who has been for years one of the foremost figures in the racing world, is prepared to sell eleven Irish-bred yearlings as a lot for 400 guineas each. These constitute the whole of his yearlings bred in Ireland. Someone may remark that, after all, 400 guineas apiece represent a substantial total figure for the lot, but what about the buying prices? It is pointed out that when his twelve Irish-bred yearlings were submitted for sale at Newmarket in December last they realised a total of 25,760 guineas or an average of 2,147 guineas each. At the same sale the Aga Khan also received 10,950 guineas for seven yearlings from his studs in Normandy, an average of 1,564 guineas each, while the highest price was 4,000 guineas paid for a colt."

# NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

### Diary of Events

Aug. 5th.—Meeting of the Editorial Committee, N.V.M.A., at 36, Gordon Square, W.C.1, 4 p.m.

* * * * *

### "Reservation" of the Profession

At a recent meeting of the Council of the National Veterinary Medical Association, the question of reservation was fully discussed by the members present. The general consensus of opinion appeared to be that a case had been made out for the partial de-reservation of veterinary surgeons and veterinary students and suggestions were made as to the lines upon which this might be carried out.

The President of the Association transmitted these views to a conference held at 10, Red Lion Square, W.C.1, on Thursday, July 11th, which was attended by Mr. John Holroyd, President of the Royal College of Veterinary Surgeons; Brigadier C. A. Murray (Director, Army Veterinary Services), Colonel Glyn Lloyd (Assistant Director, Army Veterinary Services); Mr. C. Nathan (Administrative Chief of the Animal Health Division, Ministry of Agriculture and Fisheries), and the Deputy Chief of the Division, Mr. E. C. Lloyd.

At this meeting the matter of reservation was discussed in all its aspects. Since that date a communication has been received by the Royal College of Veterinary Surgeons from the Ministry of Labour, adverting to the question of reservation, and we now understand that the whole matter is to be discussed at a full meeting of the Council of the Royal College called for Tuesday next. We hope then to be in a position to make an authoritative statement to our members concerning this vexed question upon which so many members of the profession—and not least the recent graduates—are earnestly seeking official guidance.

* * * * *

### N.V.M.A. Tuberculin Test Committee

It is now some time since the above Committee of the Association had its last meeting. Since then, certain circumstances have somewhat altered much of the tuberculin testing done by members. The Committee would welcome observations from members concerning their experiences under the new conditions, in order that their reports may be considered at a meeting shortly to be held.

* * * * *

### The Association's Advertising Policy

In view of the adoption by the Council of the National Veterinary Medical Association of the Editorial Committee's recommendations concerning the acceptance of advertisements for the *Veterinary Record*, we would like to express our appreciation of the readiness with which those of our advertisers who have been approached in the matter have accepted suggestions put to them by the Association for the withdrawal from their schedules of certain announcements to which exception has been taken.

They have been given to understand that the Editorial Committee are prepared to review the question of giving publicity to these announcements in the light of evidence, in support of claims made therein, which may be submitted at some future date.

* * * * *

### National A.R.P. for Animals Committee

#### Treatment and Salvage of Farm Stock: Permission to Proceed

The Chief Executive Officer informs us that the Home Office has now received an assurance from the War Office to the effect that the Military Authorities are being made fully cognisant of the necessity of allowing the personnel of the National A.R.P. for Animals Committee engaged upon the treatment and salvage of farm stock to be permitted to proceed in order to execute these important functions.

. . . . .

#### Issue of Identity Cards

An identity card is being issued for the use of members of the Technical Branch. These are being issued as quickly as possible, as production of the card will ensure permission to proceed in order to carry out the important duties which devolve upon this branch. The reverse side of the identity card is left blank and it is suggested that a photograph of the bearer should be affixed thereon.

. . . . .

#### Issue of Petrol to N.A.R.P.A.C. Officers

In furtherance of the efforts made from Headquarters to arrange for the distribution of petrol within all Divisions of the Ministry of Mines, a meeting has recently been held between representatives of the Ministry and the Executive Officers of the National A.R.P. for Animals Committee, at which the desirability of arranging a scheme for the whole country was discussed.

It was agreed that there should be appointed N.A.R.P.AC. Petrol Liaison Officers. These will be supplied with a number of sealed envelopes containing petrol vouchers or coupons for use only in time of emergency. These sealed envelopes will be issued by them to veterinary officers and other members of their technical organisation who are likely to use their cars at these times.

This scheme will be country-wide in its application and further details will be issued as soon as final arrangements have been made, which it is hoped will be within the next few days.

* * * * *

## PERSONAL

#### Ministry of Agriculture, Northern Ireland, Appointments

Mr. James McAllan, M.A., B.SC., M.R.C.V.S., Chief Veterinary Officer, Ministry of Agriculture, Northern Ireland, has been appointed an Assistant Secretary of the Ministry and Capt. Alexander Monro, F.R.C.V.S., Deputy C.V.O., has been appointed Chief Veterinary Officer.

. . . . .

*Will.*—Mr. William Jackson Young, veterinary surgeon, 429, Great Western Road, Aberdeen, who died on June 1st, left net heritable and movable estate amounting to £14,363.

#### R.C.V.S. Obituary

Hickes, Robert Jon., J.P., F.R.C.V.S., Givendale Lodge, Market Weighton, Yorks. Graduated N. Edinburgh, April 20th, 1883. Died July 15th, 1940; aged 81 years.

#### Mr. R. J. Hickes, J.P., F.R.C.V.S.

Mr. Robert Jonathan Hickes, J.P., F.R.C.V.S., whose death we record with deep regret, was Examiner in Veterinary Surgery and Obstetrics for the Royal College of Veterinary Surgeons for the remarkable period of 30 years—1907-1937.

We hope to publish in a later issue an appreciation of Mr. Hickes, who, prior to his retirement a few years ago, was one of the best-known veterinary surgeons in the East Riding, and held inspectorship positions under the Board of Agriculture and the East Riding County Council.

The funeral service—at All Saints' Chapel, Market Weighton, on July 17th—was taken by the Rev. A. Ferguson, Rector of Bainton, the Lesson being read by the Rev. D. G. Evans, Vicar of Market Weighton, who also officiated at the graveside at Holme Road Burial Ground. The Ministry of Agriculture was represented by Mr. J. O. Powley, M.R.C.V.S., Superintending Inspector, and the large assembly also included Mr. J. P. Cook, M.R.C.V.S., of Market Weighton.

* * * * *

## SEVEN-YEAR EXTENSION OF ATTESTED HERDS SCHEME

In the House of Commons last week the Minister of Agriculture introduced a new Bill to strengthen the hands of the County Committees in speeding up the effort on the land. In addition to new proposals for ensuring that necessary work on the land is carried out in the default of the owner or occupier, who will be called upon to meet the cost, the Bill will give effect to certain changes which are essential for the next food production campaign.

The Attested Herds scheme, which would otherwise come to an end this year, will be extended by the Bill for a further period of seven years. The Ministry of Agriculture will assume full responsibility for the payment of the special bonus of 1d. a gallon on milk produced by these herds. The existing arrangement under which this payment may be charged to Milk Marketing Board funds, is cancelled.

* * * * *

*Erratum.*—In Professor McCunn's contribution to the Central Veterinary Society discussion on "Some Septic Conditions in Small Animals" (Miss C. M. Ford), *V.R.* **52**, 528, col. 2, para. 1, in the sentence "The posterior part of the genital tract was rich in *Bacillus coli* and these organisms could transfer by the transperitoneal route," for "genital" *read* "alimentary."

# CORRESPONDENCE

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

*The views expressed in letters addressed to the Editor represent the personal view of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.*

* * * * *

## "RESERVATION" OF THE PROFESSION

To the Editor of the Veterinary Record

Sir,—

"Then rode Geraint into the castle court
His charger trampling many a prickly star
Of sprouted thistle or the broken stones:
He looked . . . and saw that all was ruinous."

There was once an old lady, mistress of a considerable household, who said that when one of her maids was

peevish and ill-tempered, she gave her a dose of salts, but when *all* the maids were peevish and ill-tempered, she took a dose of salts herself. This story came back to me on reading Mr. Bevan's dirge in your issue of July 13th, and I commend it to him for consideration and appropriate action.

He comes back from abroad and sees a neglected profession, colleges fallen to ruins, a State Veterinary Service created to destroy, and poverty-stricken general practitioners fast becoming extinct; each time he comes back he finds it all worse and worse, and the profession more and more neglected.

I have given my eyes a good rub, and I do not see it his way at all. During most of the time Mr. Bevan has been away, I have been making an extensive and extended veterinary tour of Great Britain, which has given good opportunity for observation; during the time he has been away the profession has successfully got round more than one awkward corner.

Mr. Bevan sees decay and ruin, but is blind to the rebuilding. If he goes to Edinburgh, they will show him a good deal at the Dick College, but not much decay. If Edinburgh is too far, let him take a walk to Camden Town (though if I accompany him he must bate a little of the pace we made when he and I used to give the horse-bus a start and beat it to the Euston Road!). There he will see what has replaced the decay of our early days; though now, alas, it is for the time deserted, it is far from being a ruin nor has it the stamp of a token of poverty.

But though buildings are something, and mean something, the vital human spark means more, and a profession which is "more and more neglected" is unlikely to retain that spark. Where, I wonder, did Mr. Bevan get the idea that the general practitioner is so hard put to it to maintain a livelihood and that he is "fast becoming extinct"? Has he, passing through the country towns and, missing the old veterinary establishments there, concluded that they have ceased to exist, again having a keen eye for decay but not for what has replaced it? If he makes enquiry, he will find that, thanks to improved communications and being no longer tied to the High Street and Market Square, the general practitioner and his partners have moved to pleasant dwellings a little out of the town. There, if he is lucky in his time of day, Mr. Bevan will find him; from there, alert, efficient and confident, he bestows his blessings on the countryside, and although he does not get the equivalent in cash returns (for that would be impossible) there is nevertheless evidence that the reward is not so ill. The general practitioner may have his troubles but he is not the draggled moulting Dodo Mr. Bevan tries to depict.

Mr. Bevan applies the same gravel-blind vision to the State Veterinary Service with its destructive policy "based on thermometer and gun" and all the rest of the bally-hoo. No doubt the bantling has many imperfections and may look a little ungainly to a not-too-friendly eye, but it is a mighty improvement on anything there was before Mr. Bevan went away in 1905, and it holds yet mightier promise.

None of my friends will think me guilty of complete satisfaction with things as they are, or believe that I would deny to the profession further advance and the fulfilment of a higher purpose. Far from that, but I resent the allusions to ruin, decadence, poverty and approaching extinction. We are a lively and healthy growth, and the plant is still in vigorous bud by the Thames, Forth, Clyde and Mersey. Good lads are coming along, and I thank God that those of Mr. Bevan's generation and mine have not wasted the inheritance, but can hand it on with pride in the past and with confidence and high hope for the future.

Yours faithfully,

Esmond Brown.

Bath.

*July 14th*, 1940.

## THE LORD MAYOR'S RED CROSS AND ST. JOHN FUND

To the Editor of the Veterinary Record

Sir,—At a time when the needs of the Lord Mayor's Red Cross and St. John Fund are so urgent there must be many students and veterinary surgeons who would wish to help the Fund but are unable to do so by cash contributions. Some of these men and women are in possession of gold or silver medals awarded in the past by the Royal Veterinary College Medical Association or by other bodies and may be willing to contribute them to the Fund. The gold medals awarded by the Royal Veterinary College Medical Association are worth approximately 30s. and the silver medals about 1s.; in the case of the latter the owners might prefer to send a small cash contribution instead of the medal. Bronze medals are almost without material value, but a small or large gift from their owners would be very welcome.

In addition, there may be many who have old gold or silver articles which they can spare and which, like the majority of medals, are lying hidden away and serving no useful purpose. The sentimental value of medals and other valuables to their owners will be increased by the knowledge that they are being devoted to this most deserving of all charities at such a critical time.

In the case of medals awarded by the R.V.C.M.A. the Council of the Association proposes to issue in exchange for the medals a certificate similar to that now awarded. Early this year the Council decided to suspend temporarily the issue of medals and to replace them by a certificate and cash voucher, the latter to be used for the purchase of books or instruments.

May I appeal to owners of medals or other valuables to send them to me at the address given, together with any cash contributions which can be spared. An immediate acknowledgment will be sent and the best possible price will be obtained for the articles received. It is hoped to publish a list of contributors together with the amount received as soon as possible. The scheme is a personal effort backed by the unanimous support of the Council of the R.V.C.M.A.

The success of this appeal will mean a considerable personal sacrifice by members of the profession at a time when such an effort is most needed, and I trust that the scheme will commend itself to all and not alone to the medallists.

I am,

Yours faithfully,

E. G. White,

*Hon. Secretary, Royal Veterinary College Medical Association.*

Research Institute in Animal Pathology,
Royal Veterinary College,
"The Beeches,"
Streatley, Berks.

P.S.—Veterinarians who may prefer their contributions to be given in whole or in part to the Victoria Veterinary Benevolent Fund or the National Veterinary Benevolent and Mutual Defence Society are invited to suggest this procedure when submitting their gifts. The writer understands that the present needs of these Funds are greater than ever and likely to increase as a result of present conditions.—E.G.W.

---

A Yorkshire allocator was fined £140 last week for permitting unlicensed slaughtering on his premises, possessing meat unfit for sale, using an unlicensed slaughterhouse, failing to notify slaughter of animals, and failing to record movement of animals.

# Contents


PAGE

GENERAL ARTICLE:

The Worm Burden of Fat Lambs and the Diagnosis of Gastro-intestinal Helminthiasis D. ROBERTSON 553

DISCUSSION (Royal Society of Medicine):

Salmonella Infections ... ... ... ... 556

EDITORIAL:

Salmonella Infections ... ... ... ... 557

CLINICAL COMMUNICATION:

The Sulphonamide Compounds, and Some Reflections on Veterinary Medicines in General Practice ... ... ... W. M. SCOTT 558

ANNOTATION:

The Bacteriology of Infected Wounds W. M. H. 559

ABSTRACTS:

Physiological Studies of Induced and Natural Bloat in Dairy Cattle (Doughty, R. W.) A. E. K. 560

The Assimilation of Calcium and Phosphorus by the Growing Bovine (Otto, J. S.) ... A. E. K. 560

A New Disease of Pigs (Donatien, A., and Lestoquard, F.) ... ... ... ... ... D. M. 561

The Chemotherapy of *Cl. welchii* Type A and *Cl. septique* Infections in Mice (Stephenson, Dora, and Ross, Helen) ... A. E. K. 561

The Toxicity of Some Dipping Fluids containing Arsenic and Sulphur (Steyn, D. G., and Bekker, P. M.) ... ... ... L. E. W. B. 561

PAGE

ROYAL COLLEGE OF VETERINARY SURGEONS:

Membership Examination Results (*continued*) ... 562

IN PARLIAMENT ... ... ... ... ... 563

REVIEW:

"Single and Pair Horse Driving" (Major-General Geoffrey H. A. White) ... ... ... ... 563

NOTES AND NEWS:

London College Tennis for the V.V.B.F. ... 557

Channel Islands Cattle ... ... ... ... 557

Staffing of Essential Medical Posts ... ... 562

Diary of Events ... ... ... ... ... 564

Compensation for Loss of Livestock ... ... 564

Royal Veterinary College: Purchase of Property at Streatley, Berks ... ... ... ... 564

Personal ... ... ... ... ... ... 564

R.C.V.S. Obituary: Mr. Thos. Parker, F.R.C.V.S.; The Late Mr. R. J. Hickes, J.P., F.R.C.V.S.—An Appreciation ... ... ... ... ... 564

Legal Notes ... ... ... ... ... 565

University of Edinburgh Degree of B.Sc. ... 565

Brucellosis Melitensis Order, 1940 ... ... 565

Food Poisoning ... ... ... ... ... 566

CORRESPONDENCE:

The "Electrical Coaxer" ... EDWARD WILKINSON 569

"Reservation" of the Profession ... G. MAYALL 569

LL. E. W. BEVAN 570

DISEASES OF ANIMALS ACTS:

Summary of Returns ... ... ... ... 570



**Horses won't Slip, JAR FEET OR LEGS — IF "GRAGRIP SHOD"**

**UNIQUE HYGIENIC FEATURES of GRAGRIP SHOEING**

**RUBBER ONLY SHOE THICKNESS — NO INJURIOUS RUBBER CONTACT with FROG or FOOT**

From *Veterinary Record*, June 1st, 1940, by Present President of The National Veterinary Medical Association of Great Britain and Ireland:—

"The future of the Veterinary Profession is tied to the Chariot of *preventive medicine—animal health—animal husbandry*—If one could capitalise the losses in the Country's livestock, due to Preventable Diseases, the amount of money involved would be staggering."

Extract from "*Diseases of the Horse's Foot*," H. CAULTON REEKS, F.R.C.V.S.

"Here with this Flexible Rubber Pad we have *a Method of Shoeing* which right away *from the commencement gives* to the *frog a natural pressure, restoring* to the frog *that pressure which by shoeing has been lost.* It follows as a corollary that apart from its anti-slipping qualities, it may be recommended as *a preventive of many diseases to which the foot is subject.*"

EXTRACT from "*The Field*" regarding making commercial and other horses safe for roads.

"I find the use of the Flexible Steel Bridge Pad of inestimable benefit. *It expedites travel, by giving security of foothold, conserves the horse's energy thereby, prolongs life of shoe—All important economic factors in these days of motor competition.*" JOHN W. MCINTOSH, F.R.S.E., M.R.C.V.S., The then President of N.V.M.A.

Observations of Major BRENNAN DE VINE, M.C., F.R.C.V.S., D.V.S.M., President of National Veterinary Medical Association, 1938-9 (Late Examiner to Royal College of Veterinary Surgeons, London, on Stable Management and Shoeing).

"I have used these pads for many years on Riding, Driving and Draft Horses. They have justified all claimed for them. Their adoption to my mind is sound, both from a business and humane point of view. I can highly recommend their use."

**FIRST and UNBEATEN in WORLD-WIDE COMPETITION, Efficiency Fully Endorsed by Government, also by the Institute of Horse, London after Exhaustive Practical Trials on all Types of Horses and Roads**

As **Advisers** and **Experts**, it would **Help Owners** and **Horse Interests, To Recommend a Method of Shoeing** which is **Undeniably Effective** in **Preventing Slipping—Economic and Hygienic**

*Proofs from Patentees and Sole Manufacturers:* BY APPOINTMENT TO THE LATE KING GEORGE V.

**THE GRAY HORSESHOE PAD CO., LTD. 13-14, SUFFOLK STREET, BIRMINGHAM**

# Factors in Canine Nutrition

[ No. 31 ]

## *Vitamin B.1—Concluded*

The first symptoms of uncomplicated B.1 deficiency are those which lead up to polyneuritis, i.e., anorexia, retarded growth, loss of weight, and diarrhoea. In ordinary practice, however, and without a true picture of the diet, it is often difficult to make a certain diagnosis. Since B.1, either in the form of yeast or in ADMIN, is so easy to prescribe and has no contra-indications, it should definitely be tried out in all such cases and border cases. If the diagnosis is correct or only partly so, improvement will be noticeable within a week or ten days. Other treatment may be carried on at the same time.

### What Admin Contains

ADMIN contains a minimum of 15,625 international units of Vitamin A; 3,906 international units of Vitamin D; 2,510 international units of Vitamin B.1 per pound, and proportional amounts of the rest of the Vitamin B complex and Vitamin E, which have as yet no international standard. It supplies assimilable calcium, phosphorus, iron, copper, manganese, and iodine in the optimum quantities and proportions. Moreover, 1 oz. of ADMIN contains as much protein nourishment as 3 ozs. of prime raw fillet steak.

PACKETS 6d. and 1/6d. (about ¼-lb. and 1-lb. respectively) are sold to the general public through chemists and corn chandlers. The 7/6d. tin (containing about 7-lbs.) is supplied to qualified Veterinarians at 5/6d. Orders of 3 tins and over are sent carriage free.

**ADMIN** FORTIFIES FOOD

*Issued by COOPER McDOUGALL & ROBERTSON LTD, BERKHAMSTED, HERTS*